A New Species of Monoplacophoran from the Abyssal North Pacific

BY

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(2 Plates; 5 Text figures)

INTRODUCTION

Several Recent species of Monoplacophora belonging to the subgenera *Neopilina* and *Vema* have been reported since the initial discovery of *N. (N.) galatheae* Lemche, 1957, by the Galathea Expedition in 1952. A total of approximately 60 specimens, representing 5 species, have been collected from 19 stations in the Eastern Tropical Pacific (Filatova & Zenkevich, 1969). Only 3 specimens have been recorded from other regions: the Gulf of Aden in the Indian Ocean (Tebble, 1967); the South Atlantic off the tip of South America (Rosewater, 1970); and the Central Pacific southwest of Hawaii (Filatova *et al.*, 1968). All have been recorded in depths ranging from 1650 to 6350 m.

With the exception of the Central Pacific monoplacophoran, all have been collected in relatively close proximity to continents. Sokolova (1969) described these oceanic regions near the continental land masses where primary production is high as "eutrophic", in contrast to the sterile central "oligotrophic" areas. The Central Pacific specimen was collected by the R/V *Vityaz* from 2000 m on the slope of a guyot in the Marcus-Necker Submarine Mountains. Since the associated macrofauna was relatively diverse and abundant, Filatova *et al.* (1968) concluded that the feeding conditions on the raised guyot were more favorable than on the more characteristic, deeper oligotrophic regions that surround it. They further postulated that the distribution of monoplacophorans was restricted to eutrophic areas or to environments within otherwise oligotrophic regions with favorable feeding conditions.

However, on Leg 7 of the Scripps Institution of Oceanography Expedition *Seventow* in the North Pacific a species of monoplacophoran was obtained from a depth of more than 6000 m underlying the sterile, central water mass. The collection site is located in the center of the oligotrophic region where the estimated biomass of the bottom fauna (0.01 to 0.05 g/m^2) is extremely low (Filatova, 1969). Thus, contrary to previous information, monoplacophorans are able to survive in nutrient-poor, oligotrophic environments.

This Central North Pacific species of monoplacophoran is distinct from other known species and is described in this report as a new species of the genus *Neopilina*. In addition, a series of scanning electron micrographs illustrating the details of the elaborate shell sculpture of the new species is included.

SYSTEMATICS

MONOPLACOPHORA
Wenz in Knight, 1952

TRYBLIDIOIDEA Lemche, 1957

Tryblidiacea Pilsbry in Zittel, 1899

Tribldiidae Pilsbry in Zittel, 1899

Neopilina Lemche, 1957

Neopilina (Neopilina) ***oligotropha*** Rokop, spec. nov.

(Figures 1 to 5 and 6 to 9)

Description of Holotype: Shell small, thin, patelliform and semitransparent. Shell sculpture of concentric and radial elevated threads. Radial threads increasing in number abapically from approximately 40 near the apex to 135 - 140 peripherally. Concentric threads 12 in number anterior to the apex and 32 in number along the midline from apex to posterior margin. The intersection of radial and concentric threads producing raised nodes and delimiting quadrate depressions (150 - 200/mm^2). Aperture

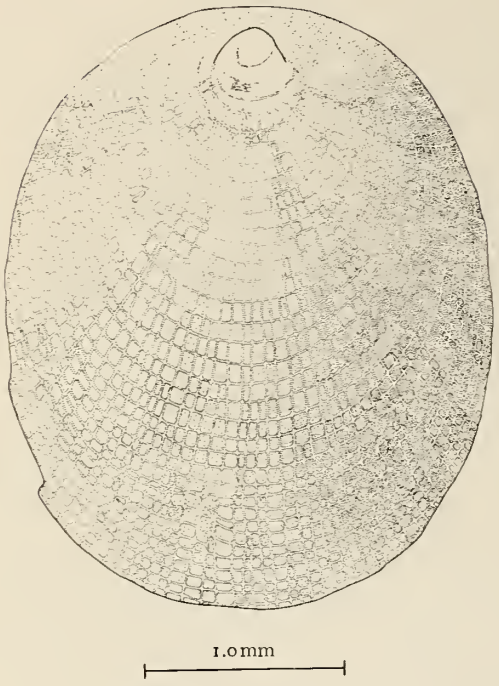

Figure 1

Dorsal view of the shell of *Neopilina (Neopilina) **oligotropha*** Rokop, spec. nov. Holotype, USNM no. 723796

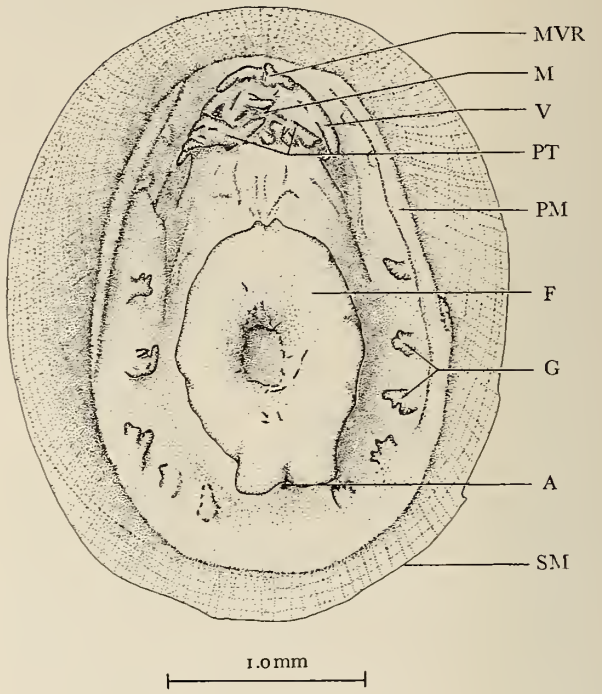

Figure 2

Ventral view of the holotype of *Neopilina (Neopilina) **oligotropha*** Rokop, spec. nov.
MVR – median velar ridge M – mouth V – velum
PT – postoral tentacles PM – pallial margin F – foot
G – gills A – anus SM – shell margin

ovate, slightly longer than wide. Apex prominent, discoidal, positioned slightly posterior of anterior margin. Periostracum pale yellowish and transparent, noticeable only along the margin where it projects beyond the shell.

The external morphology of the animal is exposed in ventral view. The prominent subcircular foot is surrounded laterally by the marked depression of the pallial area. Along each side is a row of 5 small, lobate gills. The oral region is bound anterolaterally by the velum and posteriorly by numerous postoral tentacles. The gut, with 4 distinct coils, terminates posteriorly at the anus, located at the base of the foot.

Dimensions: Shell length 3.0 mm, width 2.5 mm, maximum height (depth) 0.9 mm, apex height 0.7 mm, apex to anterior margin 0.1 mm.

Comparisons: On the basis of gill number, the present new species has been placed in *Neopilina s. s.* rather than

Explanation of Figures 6 and 7

Scanning electron micrographs of the shell surface features of *Neopilina (Neopilina) **oligotropha*** Rokop, spec. nov.

Figure 6: Oblique view of the entire shell fragment showing the overall pattern of the radial and concentric sculpture. ×40
Figure 7: Portion of the fractured edge of the shell fragment illustrating the relief of the sculpture and the granular, porous nature of the shell structure. ×510
sm – shell margin c – concentric thread r – radial thread
fe – fractured edge

Figure 6

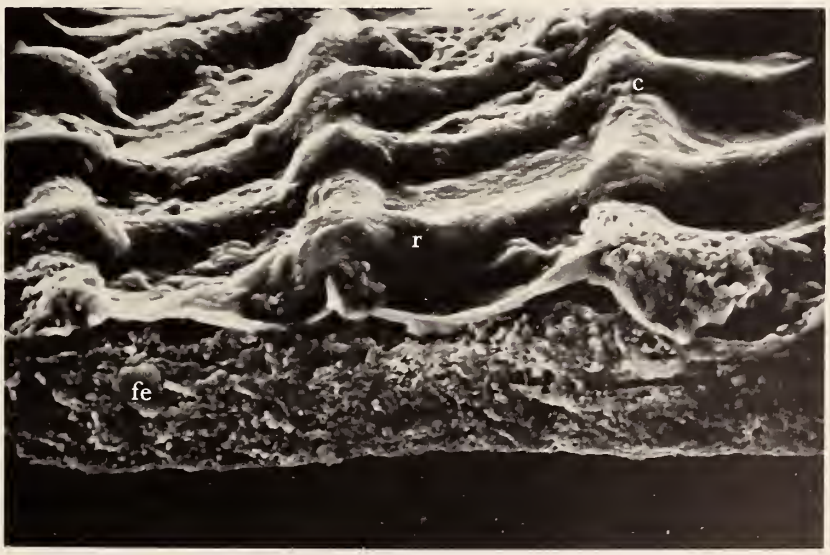

Figure 7

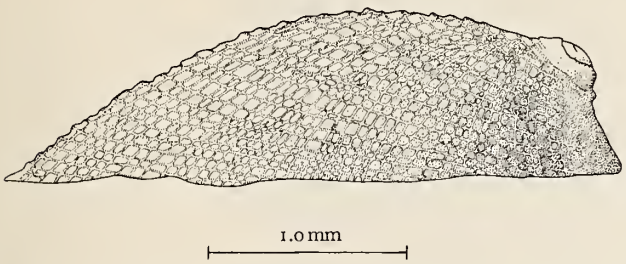

Figure 3

Lateral view of the holotype of
Neopilina (Neopilina) ***oligotropha*** Rokop, spec. nov.

the subgenus *Vema*. Members of *Vema*, of which *N. (V.) ewingi* Clarke & Menzies, 1959, is the type, possess 6 pairs of gills in contrast to the 5 pairs present in the subgenus *Neopilina*.

Of the other members of the subgenus *Neopilina*, the present new species most closely resembles *N. (N.) veleronis* Menzies & Layton, 1962. Both *N. (N.) veleronis* and *N. (N.)* ***oligotropha*** are small (1 - 3 mm), distinctly ovate in outline, and have small lobate gills. However, the postoral tentacles are simple, unbranched projections in *N. (N.) veleronis* and the shell apex characteristically extends beyond the anterior margin; *N. (N.)* ***oligotropha*** differs in having multiple postoral tentacles and a shell apex which does not extend anteriorly over the margin of the aperture.

Collection: Scripps Institution of Oceanography Expedition *Seventow*, Leg 7, Station H-30. Central North Pacific, approximately 680 miles N of Hawaii (30°05′N, 156°11′ 48″W), 6065 - 6079 m, 8 July 1970, R/V *Thomas Washington*. Gear: Epibenthic Sled (Hessler & Sanders, 1967) equipped with a 0.5 mm mesh trawl bag. One specimen (holotype) and 1 shell fragment.

Holotype Deposition: National Museum of Natural History (U. S. N. M.), Smithsonian Institution, Washington, D. C. USNM No. 723796.

Key to the Species of the Subgenus *Neopilina*

1. Specimens large (10 - 36 mm); shell almost circular in outline; gills branching, with 5 - 8 lamellae 2
– Specimens small (1 - 3 mm); shell longer than wide, ovate in outline; gills with 1 - 4 small lobes 4
2. Postoral tentacles well developed and numerous; gills with 6 - 8 lamellae 3
– Postoral tentacles reduced; gills with 5 lamellae ..... *Neopilina (N.) bruuni* Menzies, 1968
3. Shell apex almost immediately over the anterior margin ..... *N. (N.) galatheae* Lemche, 1957
– Shell apex set back from the anterior margin ..... *N. (N.) adenensis* Tebble, 1967
4. Postoral tentacles simple, unbranched; shell apex projecting beyond the shell margin ..... *N. (N.) veleronis* Menzies & Layton, 1962
– Postoral tentacles multiple; shell apex not extending beyond the shell margin ..... *N. (N.)* ***oligotropha*** Rokop, spec. nov.

REMARKS

Size: Members of the benthic fauna of oligotrophic areas of the deep-sea are characteristically very small in size. All the gastropods and pelecypods from the same epibenthic sled lowering (Station H-30) were under 6 mm in maximum dimensions and the majority were smaller than 3 mm. Hence, *Neopilina (Neopilina)* ***oligotropha*** is not unusually small but rather of moderate size for this particular environment. Furthermore, the size range of the 14 specimens of *N. (N.) veleronis* collected by the R/V *Velero IV* off Baja California was 1.1 to 2.6 mm and those close to 2 mm in length had mature ova (Menzies & Layton, 1962). Thus, there is no compelling reason to suspect that the type of *N. (N.)* ***oligotropha*** is an immature growth stage of a larger form.

Protoconch: The apex of *Neopilina (Neopilina)* ***oligotropha*** is smooth and discoidal, displaying no distinct coiled protoconch. A small dark area, however, is present a short distance behind the apex center (Figure 4). This mark possibly indicates one of the places of contact of a lost protoconch as in *N. (N.) galatheae* (Lemche & Wingstrand, 1959: plt. 10, fig. 35).

Figure 4

Apical portion of the shell of
Neopilina (Neopilina) ***oligotropha*** Rokop, spec. nov.